understood that anything like a complete treatment of the diurnal variation requires a careful study of the influence of the season of the year as well as the relation to sun-spot frequency. The proposal advocated by von Bezold and others to effect a line integration round a parallel of latitude ought before its adoption to receive careful consideration from the side of atmospheric electricity. It should be remembered that the earth-air currents required to invalidate the hypothesis embodied in the Gaussian potential are not transient currents varying with the hour of the day or with the weather—such currents could only modify the magnetic diurnal inequality or cause irregular disturbances—but currents of practically constant value and direction over large areas.

Since the above was written, science has had to mourn the death of the distinguished author, Prof. von Bezold, a fact already announced to the readers of Nature (February 21, p. 397).

Charles Chree.

THE COLLOIDAL THEORY OF DYEING.

The Chemistry and Physics of Dyeing. By W. P. Dreaper. Pp. viii+315; illustrated. (London: J. and A. Churchill, 1906.) Price 10*s.* 6*d.* net.

Wm Gardner

WHEN it is remembered that dyeing has become a highly scientific process, it is somewhat strange to note what a small part theoretical considerations have played in the practical development of the art, a fact no doubt largely due to the lack of definite knowledge of the chemical constitution of textile fibres. Most manuals of dyeing have been written for practical ends, and have devoted small space to the consideration of the various theories of dyeing which have been put forward, since, as before remarked, these have helped but little in the practical solution of dye-house problems. Our knowledge of the nature of fibres has, however, now reached a point when it is undoubtedly of value that the scientific dyer should make himself acquainted with this side of his subject, and recent work on the nature and properties of colloids certainly appears to throw much new light on the intricate nature of dyeing processes.

It has, of course, long been known that one and the same kind of fibre acts differently towards various dyes, and that dyestuffs may be classified into groups on the basis of this differentiation. To a considerable extent this grouping is found to correspond with fundamental similarities in the chemical constitution of the dyes, and this broad fact has lent strong support to the chemical theory of dyeing.

The older theories of dyeing could be broadly classified into two groups, those assuming a chemical reaction between fibre and dye, and those in which dyeing phenomena are explained by the physical properties of the reacting bodies. To a great extent these theories are antagonistic, and yet upholders of each are able to put forward incontrovertible facts in their support. It is, however, far from satisfactory to have to assume that similar phenomena can be explained in one case by a certain theory and in a second by an opposite theory, and the time is ripe for a wider view which shall embrace and reconcile all well-established facts concerned with dyeing processes. How far the colloidal theory of dyeing is successful in doing this may be gathered from a perusal of the book under review. Much of the experimental work mentioned lacks precision, and the various researches are somewhat detached, but the present knowledge of colloidal conditions and functions, incomplete as it is, throws much light on earlier work, and from further work in this direction a satisfactory explanation of dyeing processes may eventually emerge. In the past many difficulties, in regard to dyeing theory as in other directions, have arisen from an attempt to draw a hard and fast line between chemical and physical action, and the blending of the two may be considered as the characteristic feature of the reactions of colloids.

The book is arranged in twelve chapters, of which the first is devoted to a historical introduction, which might with advantage have been considerably extended. The properties and reactions of fibres, dyes, mordants, and assistants are dealt with in chapters ii.–v. Chapter vi. contains an excellent summary of the recent work on the properties of colloids. Chapter vii. gives facts in support of the old mechanical theory of dyeing which reached its final development in the solid solution theory of van 't Hoff and Arrhenius, which was applied to dyeing processes by O. N. Witt. Chapters viii. and ix. give a similar summary of facts supporting the chemical theory of dyeing. Then follows in chapter x. an attempt to show the application of the colloidal theory, and in this the incompleteness of the evidence becomes apparent, though as a suggestive contribution it is very interesting. A chapter on the action of light on dyeing operations and dyed fabrics appears to have little connection with the central theme of the work.

The many inaccuracies in the book lay it open to a good deal of minor criticism. For example, on p. 14 several of the formulæ are altogether inexplicable. On p. 33 it is stated that Bancroft divided dyes into *subjective* and adjective, the term used by Bancroft being *substantive.* A fair summary of the work of various investigators is usually given in the text, but it is often difficult to ascertain at what point the summary ends and the author's comments begin. There is thus some danger of injustice to one or other. Since both centigrade and Fahrenheit thermometric scales are used in the book, some confusion arises in the frequent cases where a temperature figure is given without indicating which scale it refers to. Amongst mis-spelt authors' names may be mentioned Verquin for Verguin, Pokorng for Pokorny (several times), Prager for Perger, Brand for Brandt, Boettinger for Böttiger, and Hirst for Hurst.

The general plan of the book is excellent, and the author's work, though somewhat unequal, is on the whole very satisfactory. The production of such a book would have been impossible a few years ago, and it marks a distinct advance in the linking up of one of the most ancient arts with modern scientific

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theory, and shows a common ground where the practical dyer, the chemist, and the physicist may meet. Its study will well repay all students of dyeing and those practically engaged in the textile trades who have been able to keep in any way abreast with recent work. Walter M. Gardner.

THE WAYS OF WILDFOWL.

Practical Wildfowling. A Complete Guide to the Art of the Fowler, with Descriptions of the Various Birds usually met with. By W. J. Fallon. Second edition, revised and greatly enlarged. Pp. 248; illustrated. (London: L. Upcott Gill; New York: Chas. Scribner's Sons, 1907.) Price 6s.

THE new edition of Mr. Fallon's useful little handbook of practical wildfowling has been brought up to date, and a considerable amount of new matter and many new illustrations have been added. Thoroughly to enjoy his sport the wildfowler must be a good field naturalist, and this little work aims, *inter alia*, at making easy the identification of those species of birds he is most likely to meet with. The enjoyment of wildfowling lies not only in killing, but in seeking to kill by pitting one's endeavours and skill against the cunning and wariness of the fowl. Unlike pheasants and partridges, they cannot be brought over the guns. Herein lies the essence of the sport, and hence the absolute necessity of understanding the life-habits and peculiarities of the various kinds of wildfowl.

With the first part of this excellent manual, which deals fully with the guns, boats, ammunition, and other outfit and accessories necessary for the pursuit, we are not immediately concerned, but pass on to the chapters on the art of wildfowling, for therein much may be learned about the habits of some of the shyest of birds. To be a successful wildfowler, a man must have an intimate knowledge of the birds' ways and behaviour under the varying conditions of time, tide, and weather. He must also be able to identify the fowl, not only when in hand, but when at a distance. His skill in handling the gun will avail him little if he cannot distinguish a jack snipe from a sandpiper, curlews from gulls, or ducks from divers, for all these and others must be attacked with a different strategy. To know birds, when at a little distance, by some peculiarity of motion, shape, or flight, is a great part of the fowler's craft, for the tactics adopted to secure one kind of duck may be quite inadequate in the case of some other species of this family. He must be familiar, too, with the food and the feeding-ground of the various ducks, geese, and shore birds in order to know where they may be found, and at what time of the day or night.

Naturalists, indeed, are indebted to the wildfowler for much that they have been able to record as to the habits of various wildfowl; and as Mr. Fallon essays, and very successfully, to instruct the tyro in all these things, his book appeals strongly to the field naturalist. In this part of the book the subject is treated under the heads of wild swans, wild geese, wild ducks, and shore birds, and the plan adopted is to describe each species of these groups likely (or even possible, for the rare kinds which *may* turn up any day are included) to be met with, and then to deal with the various methods of approaching and shooting them.

The identification of the different species is rendered more easy by the introduction of some very life-like figures, while in reading about the way to get at them we find ourselves learning a good deal about their individual peculiarities. In going through the book we come upon many good notes and original observations on the food and feeding habits of geese, ducks, and shore birds, and would instance the interesting remarks on the grain-feeding habits of the pink-footed goose. Many another out-of-the-way scrap of natural history, too, can be gleaned; for example, the curious habit of sheldrakes choosing as a nesting site the straw stacks which are placed in the fields as shelter for the cattle in some marshy districts. If we were disposed to be critical, we might suggest that the curlew sandpiper should not be described as of similar plumage to the dunlin, and that the white patch on the lower part of the back, so conspicuous when the former bird is flying, is a mark distinguishing the two species. Also that it is not up to date to say that a clutch of knot's eggs does not exist in any collection; not that this matters to the wildfowler. There have been many books written on wildfowling since the days of Hawker, but it is doubtful whether any of them give so much information in so small a compass as this little handbook. There is a good index, and we cannot withhold a word of especial praise from the delightful picture with a heron in the foreground.

O. V. Aplin.

OUR BOOK SHELF.

Hypnotism and Suggestion. By Edwin Ash. Pp. 134. (London: J. Jacobs, 1906.) Price 4s. net.

In the preface the author tells the reader that the objects he had in view in writing this book were to explain the technique of experimental hypnotism and suggestive therapeutics, and at the same time to endeavour to divest the subject of the air of mystery with which it is popularly invested. In an introductory chapter he briefly alludes to certain general questions connected with hypnotism. He considers that telepathy is at present "non-proven," and, further, he does not believe in a "magnetic force" for curative purposes.

The author carefully describes the methods employed in the production of hypnosis, and the earlier and later phenomena to be observed when this condition is brought about. He discusses the various stages of hypnosis, and points out the difficulties of arranging an accurate classification. In considering the use of hypnosis for surgical anæsthesia, he recognises its limitations, and although he fully realises its value, nevertheless, from the practical standpoint, the difficulty of producing it rapidly and deeply is a serious objection in the way of bringing it into general use. Post-hypnotic influence forms the subject-matter of another chapter, and its possible relationship to criminal acts is referred to. Dr. Ash agrees with many observers that

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